

STEVAL-USBPD45C USB PD compliance reports

Introduction

This technical note details the USB Type-C and PD compliance tests for the STEVAL-USBPD45C 45W AC-DC adapter reference design kit, which embeds a USB Type-C connector and functions as a single port USB Power Delivery provider in a compact and lightweight design.

The tests were performed to verify compliance with USB Type-C and USB Power Delivery specifications using USB PD compliance test equipment.

The results of the tests verify that the STEVAL-USBPD45C is USB PD 3.0 compliance ready.

Table 1. Main components

Component	Description
STEVAL-USBPD45C	45 W USB Type-C Power Delivery adapter reference design
STM32F051K8	high performance 32-bit ARM Cortex-M0 MCU
STUSB1602A	USB Type-C controller (with Tx/Rx line driver and BMC)
STCH03RT	Offline PWM controller for low standby adapters

1 Test package description

This test package contains the results achieved from internal USB PD compliance testing on the following Unit Under Test (UUT):

- STEVAL-USBPD45C adapter kit, consisting of the following boards:
 - one STEVAL-USBPD45P power supply board
 - one STEVAL-USBPD45I digital control board

The [STEVAL-USBPD45C](#) accepts wide input mains range and provides 5V, 9V and 15V output voltages according to the source power rules of the USB power delivery specification.

The tests were conducted on the STEVAL-USBPD45C running the application firmware available in the [STSW-USBPD45CFW](#) software package.

The STSW-USBPD45CFW software package contains the binary file for the reference design to function as a 45 W AC-DC adapter (in the USB Power Delivery provider role), and implement the adaptive synchronous rectification algorithm. The software is distributed under Production Limited License Agreement ("PLLA").

Figure 1. STEVAL-USBPD45C 45 W AC-DC adapter reference design kit



1.1 USB Type-C and Power Delivery tool details

The tests were performed in ST labs with the official USB-IF Type-C and Power Delivery tools listed in the following table.

Table 2. Tool summary

USB-IF approved tool	Software (PC)	SW Version
Ellisys USB Explorer 350	USB Explorer 350 Examiner	v.3.1.6786
MQP USB-PDT	GraphicsUSB	v.5.66.00
Teledyne LeCroy Voyager M310C	USB Compliance Suite USB Protocol Suite	v.3.55 Build 750 v.7.68 Build 2771
Granite River Labs GRL-USB-PD-C1	GRL USB-PD Software	v.1.2.9.11

1.1.1 Package contents

Table 3. Package contents

Type	Name	Description
	000_Collaterals	VIF file
	001_Ellisys	Ellisys reports and traces
	002_MQP	MQP reports and traces
	003_LeCroy	LeCroy reports and traces
	004_GRL	GRL reports and traces
	Readme.txt	readme file
	TestReports.pdf	Global reports
	TestReports_001_Ellisys.pdf	Ellisys specific report
	TestReports_002_MQP.pdf	MQP specific report
	TestReports_003_LeCroy.pdf	LeCroy specific report
	TestReports_004_GRL.pdf	GRL specific report

Note: Each tool provides the traces in a custom file format, please refer to the tool-specific documentation to open it.

1.1.2 Test results

The following table summarizes the tests carried out on the STEVAL-USBPD45C with official tools.

Table 4. Test results

Item	Type-C	PD2.0	PD3.0	Power	Notes
Ellisys	✓	✓	✓	n/a	
MQP	✓	✓	✓	✓	Skipped the PROT-SRC3-VCONN-SWAP, actually not implemented: requires new plug-in [PROT_SRC3_VCONN_SWAP_E1]
LeCroy	✓	✓	✓	n/a	Skipped test: “TDA 2.3.1.1 Source Dynamic Load Test”, missing an external electronic load.
GRL	✓	✓	n/a	✓	Skipped test: “POW-SRC-LOAD-P-PC”, skipped missing the external electronic load necessary to perform the tests

2 References

1. www.st.com
 - STEVAL-USBPD45C
 - STSW-USBPD45CFW
2. www.usb.org
 - USB Power Delivery Specification Revision 3.0, Version 2, 21 June 2018
 - Universal Serial Bus Type-C Cable and Connector Specification Release 1.3 July 14, 2017
3. www.ellisys.com
4. www.mqp.com
5. graniteriverlabs.com
6. teledynelecroy.com

Revision history

Table 5. Document revision history

Date	Version	Changes
11-May-2018	1	Initial release.
04-Jul-2018	2	Minor text edits
23-Oct-2018	3	Updated: Table 2. Tool summary Table 4. Test results Section 2 References Minor text edits

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